PATENT SPECIFICATION

1,137,638

DRAWINGS ATTACHED

1,137,638

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Int. Cl.:— B 24 b 23 / 06

COMPLETE SPECIFICATION

Hand-operated Belt Sanding Machine for Wood-working Purposes

We, EUGEN LUTZ KG., a Company organised and existing under the laws of the Federal Republic of Germany, of Wurttemberg, Muhlacker-Lomersheim, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a hand-operated belt sanding machine for wood-working purposes, the essential components of which are a housing, in which are accommodated the driving motor, the two sanding belt rollers and the sanding belt pressure plate, and attached to the same, a guide frame which can be placed on the work piece, and encloses the belt rollers and the pressure plate.

In the sanding belt machines of this known design, the sanding belt pressure plate is arranged within the housing in a manner such as to be adjustable as to its height in relation to the sanding belt rollers. With this arrangement, the control of the sanding belt is difficult, since the sanding belt slides laterally off the rollers, even with only a slight diagonal misalignment of the pressure plate, which is caused by the inevitable play of the bearings and wear. Moreover, the proper parallel alignment of this pressure plate in relation to the guide frame and the accurate parallel adjustment to this frame, are complicated manipulations in the case of this design, as a result of which the sanding pressure and cutting depth are often uneven.

To obviate the aforementioned disadvantages, the invention is based on the idea of employing a basically known sanding device, in which the sanding belt pressure plate is arranged in the housing, stationary in relation to the rollers, and connecting this sanding device and housing to the guide frame in a manner such as to provide the facility of a parallel vertical adjustment in height between the housing and the guide frame and, in this way, a variation in sanding pressure or cutting depth, respectively.

[*Price 4s. 6d.*]

Accordingly, the sanding belt pressure plate, in the case of the belt sanding machine following the invention, is arranged, in a basically known manner, stationary within the housing and in relation to the rollers, and the guide frame is attached to the housing in a manner such as to be adjustable while remaining parallel to the pressure plate, and a control mechanism is arranged between the housing and the frame, which enables the housing and, thus, the pressure plate to be adjusted in their height in relation to the frame. This novel design and arrangement ensure a proper parallel alignment of the pressure plate to the guide frame, whenever the height may be varied, and the result is a constant sanding pressure or a constant cutting depth as well as a proper operation of the belt. To provide a small and handy belt sanding machine which gives high sanding performance with a relatively low weight, this belt sanding machine is of such a design that at least one roller is driven by a horizontal-type small and high-speed motor, via a transmission gear. Since this transmission gear projects beyond the side of the machine housing, the guide frame of such a belt sanding machine would have to bulge at one side around this laterally projecting gear case. To obviate this and to enable a guide frame to be designed in a rectangular cross section, which tightly encloses the rollers and the sanding belt, a longitudinal groove is arranged, according to the invention, in the lower part of the housing between one of the rollers and the gear wheel driving the same, and fitting into this groove is the one side of the rectangular frame.

Further details of the invention and its advantages are described below with reference to various practical examples shown in the drawings:

Fig. 1 gives a side view of a belt sanding machine with guide frame, partially in a section following the line I/I of Fig. 3,

Fig. 2 gives a cross section following the line II/II of Fig. 1,

Fig. 3 shows the guide frame of Fig. 1 in a top view,

Fig. 4 gives a partial view in direction IV of Fig. 1, n an enlarged scale,

Fig. 5 shows a cross section following the line V/V of Fig. 4,

Fig. 6 is a section following the line VI/VI of Fig. 5,

Fig. 7 shows components of Fig. 4, in a different position,

Fig. 8 shows an alternative of the guide frame, viewed in a section according to Fig. 2,

Fig. 9 gives a view in direction of IX in Fig. 8,

Fig. 10 is a longitudinal section of a belt sanding machine in an alternative design (section following line X/X of Fig. 11),

Fig. 11 shows the guide frame of Fig. 10 in a top view (without the housing), and

Fig. 12 shows in a diagrammatic view a modified bearing of the housing on the guide frame.

In the drawing, 1 denotes a housing fitted with a handle 2 and a knob 3, in which are accommodated the driving motor 4, the two rollers 6 and 7, surrounded by the sanding belt 5, and the sanding belt pressure plate 8. The latter is secured to the housing in a rigid arrangement, i.e. stationary in relation to the rollers 6 and 7. Furthermore included is a guide frame 9 which can be placed on the work piece, and encloses the rollers 6, 7 and the pressure plate 8. The housing 1 is assembled to this guide frame by means of parallel rods 10 and 11 which, together with the housing and the guide frame, form a parallelogram linkage system. A control mechanism 12 is arranged between the housing and the frame, which permits the variation of the angular position of the parallel rods, as indicated by the angle α, and thus the adjustment of the height of the pressure plate 8 as related to the frame 9.

In the preferred embodiment shown, the rods 10 and 11 are in the form of parallel cranks, arranged at both ends of transverse shafts 13, 14. These two transverse shafts 13 and 14 are pivoted in the housing 1, and the cranks 10, 11 are fitted with crank pins 15, 16 which, in turn, are pivoted in the frame 9. The transverse shafts 13, 14 and the crank pins 15, 16 are supported in open bearings 17 and 18 of mainly semi-cylindrical shape, which are arranged at the housing 1 and the frame in a manner such that the housing 1 can be lifted off and removed from the frame 9. Clamping springs 19 on the frame and clamping springs 20 on the housing secure the crank pins 15 and 16 and the transverse shafts 13 and 14 so as to prevent the frame from being detached from the housing under its own weight.

As can be seen from the drawing, the transverse shaft 14 is in a rigid mount in the housing 1 between the pressure plate 8 and the roller 7, and its crank pins 16 brace against the semi-cylindrical bearings 18 of the frame and can be released, whilst the crank pins 15 of the other transverse shaft 13 are in a rigid mount at the frame 9 (cf. Fig. 3), and the housing 1 is supported on this transverse shaft 13 by the semi-cylindrical bearings 17 in a detachable assembly. The housing is fitted with clamping springs, not shown in the drawing, which, similar to the clamping springs 19, secure the transverse shaft 13 and prevent an accidental detaching of the frame from the housing. This means that, if the frame 9 is to be removed from the housing 1, the frame 9 is held fast by hand and the housing is lifted off, with the transverse shaft 13 remaining in the frame, whilst the crank pins 16 of the transverse shaft 14 of the housing are withdrawn from the clamping springs 19. The above mentioned control mechanism includes a spring which normally locks the housing 1 in its adjusted height in relation to the frame 9; the tension of this spring is however overcome when an increased pressure by hand is applied on the handle 2 and the knob 3 in direction V, so that the distance in height between the housing 1 and the frame 9 is reduced and, consequently, the sanding pressure is increased.

As can be seen from Figs. 1 and 3, the control mechanism 12 is preferably supported by the frame, and its setting member 21 acts on the transverse shaft 13. This setting member comprises a threaded spindle fitted with a boss-type head 22 which is split at a slot 23 so that it can be pushed on the shaft 13, and as can be seen from Fig. 1, encloses the transverse shaft 13. Furthermore, a threaded sleeve 24 is screwed on this spindle 21 and pivoted in a cross piece 25, but secured against axial displacement relative to the cross piece 25 in the direction C. This cross piece 25 is supported in two holes 26 of the frame 9 and can be turned around the horizontal axis a, which is in parallel to the transverse shaft 13. This threaded sleeve 24 is surrounded by a helical compression spring 27 which braces, at the one end, against the sleeve head 28 and, at the other end, against the cross piece 25, at 29. The grooved cap knob 32 which encloses and covers the helical spring 27 is tightly secured to the outer end of the sleeve 28 by means of a pin 31 or the like. By turning this grooved cap knob in either direction, one can move the setting member 21 in direction B or C so as to vary the angular position α of the rods 10, 11 and with this the height of the pressure plate 8. When applying an additional pressure by hand, on the housing in direction V, one overcomes the pressure of the spring 27 and shifts the threaded sleeve 24 together with the setting member 21 in direction B, which means a reduction of the angle α and consequently, an increase in sanding pressure.

The transverse shaft 14, arranged between the pressure plate 8 and the roller 7, can be shifted within the housing in axial direction, as can be seen from Figs. 4—7, i.e. it can be

shifted from the normal position shown in Figs. 4 and 5, in direction D (Fig. 7), after removal of the frame 9, so that its crank pin 16, which extends beyond the edge 33 of the belt can be returned so as to be positioned behind this edge, as shown in Fig. 7. The transverse shaft 14 and the aforementioned crank 16 do not cause therefore any obstruction to the belt sanding operation when the sanding machine is used without the frame 9.

As demonstrated in Figs. 5 and 6, the transverse shaft 14, which can be shifted in axial direction is tightly held in place in the semi-cylindrical bearings 17 by the above mentioned clamping spring 20 so as to be secured in both its axial and rotary position. This transverse shaft 14 is furthermore fitted with a tengential keyway 34, and the housing is provided with a cam 35 which fits into this keyway, and is arranged in such a manner as to secure the shaft to the bearings 17 in operative position, as can be seen from Figs. 4—6; when the shaft is, however, shifted in the axial direction E, the keyway 34 and the cam 35 will coincide, which allows the shaft 14 to be removed from the bearings 17 in direction V. In the case of the illustrated prefered embodiment, the projecting cam 35 is the head of a screw 36 which serves for tightening the clamping spring 20.

The arrangement and the design of the transverse shaft 14 in the housing as described above, thus provide the alternative of either supplying and using the belt sanding machine in the assembly of the components 1 to 8 as a self-contained unit, or operating this belt sanding machine in conjunction with the guide frame 9, by simply attaching the transverse shaft 14 or returning the crankpin 16 to its position shown in Figure 6.

In the particularly preferred example shown, the belt sanding machine is equipped with a motor 4, which drives the roller 6 via a reduction gear, arranged in the part 1*a* of the housing; this transmission takes place via a gear wheel 37 arranged on the shaft 38 of the roller 6. In this way, one can use a rather small high-speed motor 4 so as to arrive at a relatively small and handy belt sanding machine. In this case, the housing 1*a* of the reduction gear is extended, however, to a very low-extending bottom part 1*b* which encloses the gear wheel 37. A longitudinal groove 39 is arranged in the bottom of the housing 1, between the roller 6 and the gear wheel 37, driving this roller and a longitudinal flange 40 of the frame fits into this groove, so that also in the case of such a belt sanding machine equipped with a reduction gear, a rectangular frame 9 which tightly encloses the rollers 6 and 7, can be provided for. As can be seen from the drawing, this frame is of a L-profile of the width *b*, whilst the other side 40 of the frame, which fits into the groove 39, is of a rather narrow square section of the width *c* which allows this longitudinal groove to be kept to a relatively small width.

To adapt the belt sanding machine together with the guide frame 9, as described above, so that it can be used as well for grinding rebates or floor corners and the like, a special design is shown in Figs. 8 and 9, in which the guide frame 9*a*, at the side of the belt edge 33, is bent twice at right angles, once in vertical and once in horizontal outward direction, and that in a manner such that the upright frame legs 42 flush with the belt edge, indicated at 43, and the side rails 45 of the frame, which is held by the horizontally bent leg 44, is arranged at a larger distance *h* from the frame base.

As for the examples shown in Figs. 10, 11 and 12, those components of the machine which are in conformity with the above mentioned components, are denoted by the same symbols, but with an affix *a* or *c*. In the examples of the Figs. 10, 11 the guide frame 9*a* includes inclined surfaces 46 and 47 on which the housing 1*a* rests through the support of respective inclined surfaces 48, 49. Attached to the frame is furthermore a control mechanism 50—52, which provides the facility of shifting the housing 1*a* on the inclined surfaces 46, 47 of the base plate. In this way, one can adjust the height of the guide frame 9*a* in relation to the housing in such a way as to ensure a parallel position of the guide frame 9*a* against the pressure plate 8 at all times. The control mechanism in the illustrated example comprises a set spindle 21*a* which is pivoted in the guide frame and locked against axial displacement by a circlip 53. This set spindle drives a nut 51, which extends in a projecting lug 52 and engages with a respective recess in the housing. To ensure a longitudinal shift of the housing in direction L, the base plate may be provided with guide pins 54 which move in longitudinal slots 55 of the housing. To prevent detaching of the guide frame 9*a* from the housing 1*a*, when the latter is raised, one can arranged a locking device which may be composed, for instance, of a spring 56, which is attached to the housing, and a groove 57 in the pin 54 in which the said spring engages like a catch.

Instead of supporting the housing on the guide frame by means of parallel rods 10, 11, as described above (cf. Fig. 1) one, can also arranged eccentric discs 10*c*, 11*c*, which are at some distance from each other and pivoted on the guide frame at 15*c*, 16*c*, as shown in the diagrammatic view of Fig. 12. The housing 1*c* rests on these eccentric discs. One of these eccentric discs is actuated by the aforementioned control mechanism, which is attached to the frame and represented in a diagrammatic way in Fig. 12 by the push rod 21*c* which is hinged at the eccentric disc at 58.

WHAT WE CLAIM IS:—

1. A hand-operated belt sanding machine for application in wood-working, comprising a housing, a driving motor in the housing, two sanding belt rollers, at least one of said rollers being drivably connected to the motor, a

sanding belt pressure plate in the housing in a fixed position relative to the belt rollers, a guide frame means attaching the guide frame to the housing in a manner permitting relative movement of the frame and the pressure plate while maintaining the guide frame parallel to the pressure plate, and control means arranged between the housing and the frame, which enables the housing and therewith the pressure plate to be adjusted as to their height in relation to the frame.

2. A belt sanding machine according to claim 1, and including a speed reduction gear between the motor and the roller, wherein a longitudinal groove is arranged in the bottom part of the housing between the said one belt roller and a gear wheel driving the same, and a longitudinal part of the frame fits into the said groove.

3. A belt sanding machine according to claim 1 or 2, wherein the said attaching means comprise parallel members defining with the frame and the housing a parallelogram linkage.

4. A belt sanding machine according to claim 3, wherein the parallel rods are in the form of two transverse shafts pivoted in the housing and fitted with parallel cranks at both ends, the crank pins of the cranks being pivoted in the frame.

5. A belt sanding machine according to claim 4, wherein the housing or the frame is fitted with open bearings to support the rods and the crank pins in a manner such as to allow the housing the be detached from the frame by being lifted off.

6. A belt sanding machine according to claim 5, and including clamping springs acting on the transverse shafts and the crank pins to prevent the frame from being detached from the housing by its own weight.

7. A belt sanding machine according to claim 5, wherein one of said transverse shafts is in a fixed mount in the housing between the pressure plate and a belt roller and its crank pins bear against semi-cylindrical bearings on the frame from which position they can be released whilst the crank pins of the other transverse shaft are fixedly secured to the frame, and the housing rests with semi-cylindrical bearings in a detachable manner on this transverse shaft.

8. A belt sanding machine according to any of the preceding claims, wherein the control means includes a spring which normally locks the housing in its adjusted height in relation to the frame but yields under increased pressure applied on the housing by hand so that the height is reduced and therewith the sanding pressure is increased.

9. A belt sanding machine according to any of claims 4 to 8, wherein the control means is supported by the frame and acts through a setting member on one of the transverse shafts.

10. A belt sanding machine according to claim 9, wherein the setting member comprises a threaded spindle with a boss-type head which encloses the transverse shaft and, a threaded sleeve which is pivoted in a cross piece in the frame but locked against axial displacement, said threaded spindle being engaged in said sleeve.

11. A belt sanding machine according to claim 10, wherein a helical compression spring is placed on the threaded sleeve and bears at one end against the outer end of the sleeve and at its other end, against the cross-piece.

12. A belt sanding machine according to claim 11, wherein the outward end of the sleeve is secured to a grooved cap knob which encloses the helical spring.

13. A belt sanding machine according to claim 7, wherein a transverse shaft is axially adjustable in bearings in the housing between the sanding belt pressure plate and one of the rollers, in such a manner that its crank pin, which projects beyond the front edge of the belt, can be pushed backward so as to be positioned behind this edge.

14. A belt sanding machine according to claim 13, wherein the axially adjustable transverse shaft is tightly held in the semi-cylindrical bearings by a clamping spring, both as to its axial and its rotational position.

15. A belt sanding machine according to claim 13 or 14, wherein the transverse shaft is provided with a tangential keyway and, fitting into the same is a cam arranged at the housing in such a manner that the transverse shaft is secured in the bearings when in operative position, but when shifting the transverse shaft in axial direction, the keyway and the cam will coincide, so that this shaft can be withdrawn from the bearings.

16. A belt sanding machine according to claims 14 and 15, wherein the projecting cam is the head of a screw which secures the clamping spring.

17. A belt sanding machine according to any of claims 2 to 16, wherein the guide frame at the side of the belt edge of the housing is bent twice at right angles, once in vertical and once in horizontal outward direction, in such a way that the vertically bent frame legs are flush with the belt front edge and the side rail of the frame, which is held by the horizontally bent leg is arranged at a larger distance from the frame base.

18. A belt sanding machine according to any of the preceding claims, wherein the guide frame includes inclined surfaces on which the housing rests with equally inclined surfaces and said control means is arranged on the frame whereby said housing can be shifted on the inclined surfaces of the base plate.

19. A belt sanding machine according to any of claims 1 to 17, wherein the housing is supported by eccentric discs arranged at a certain spacing on the guide frame, and said control means controls one of the eccentric discs and is attached to the frame.

20. A belt sanding machine, substantially as hereinbefore described with reference to any of the accompanying drawings.

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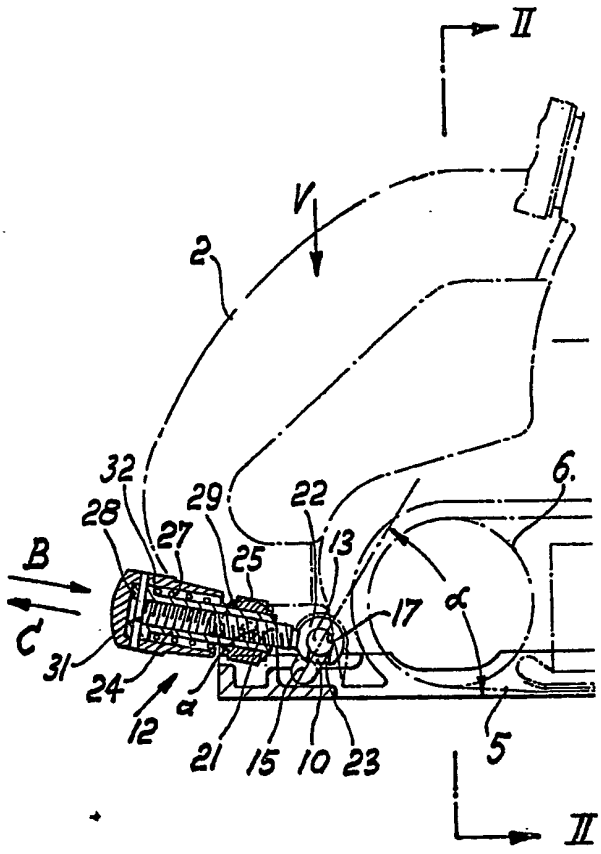
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Fig. 1.

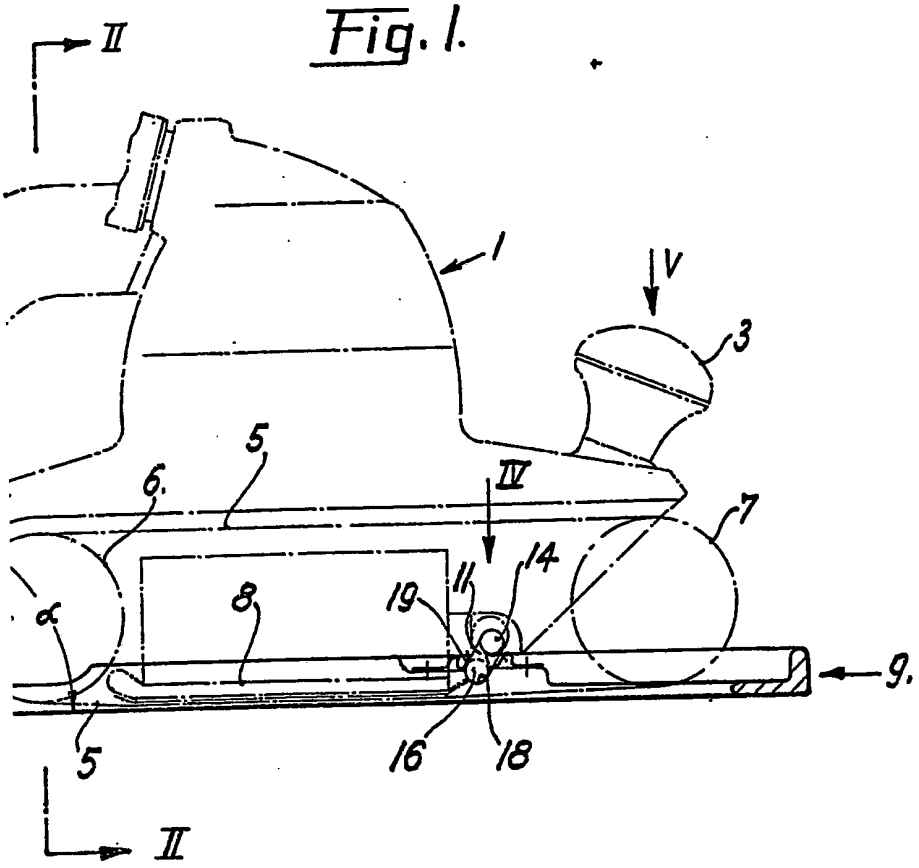

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Fig. 1.

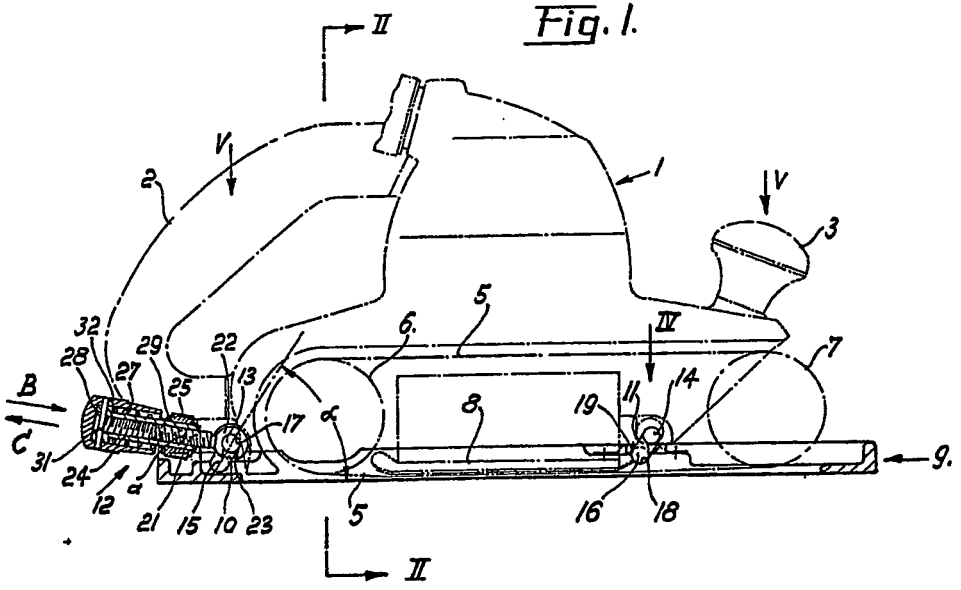
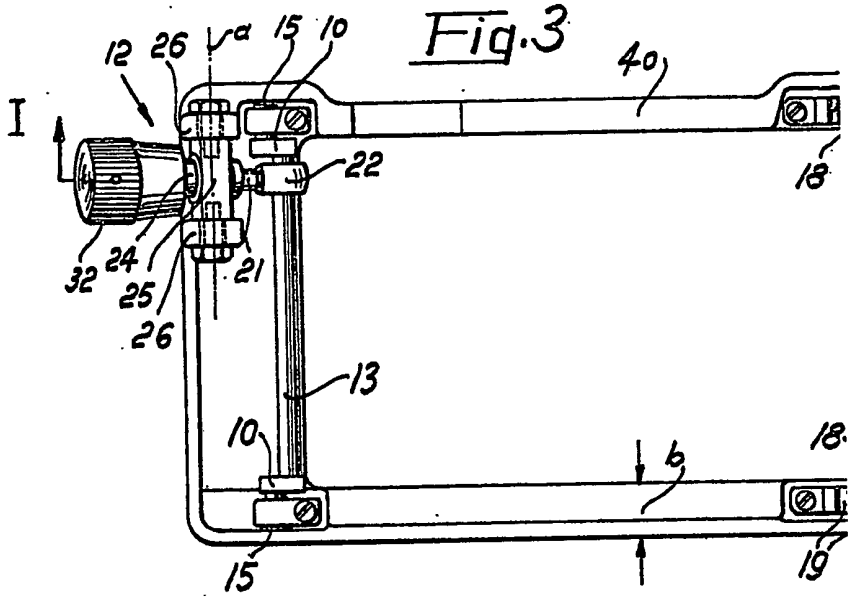


Fig.3



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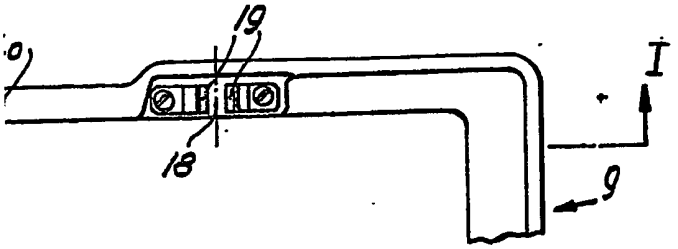

Fig.2

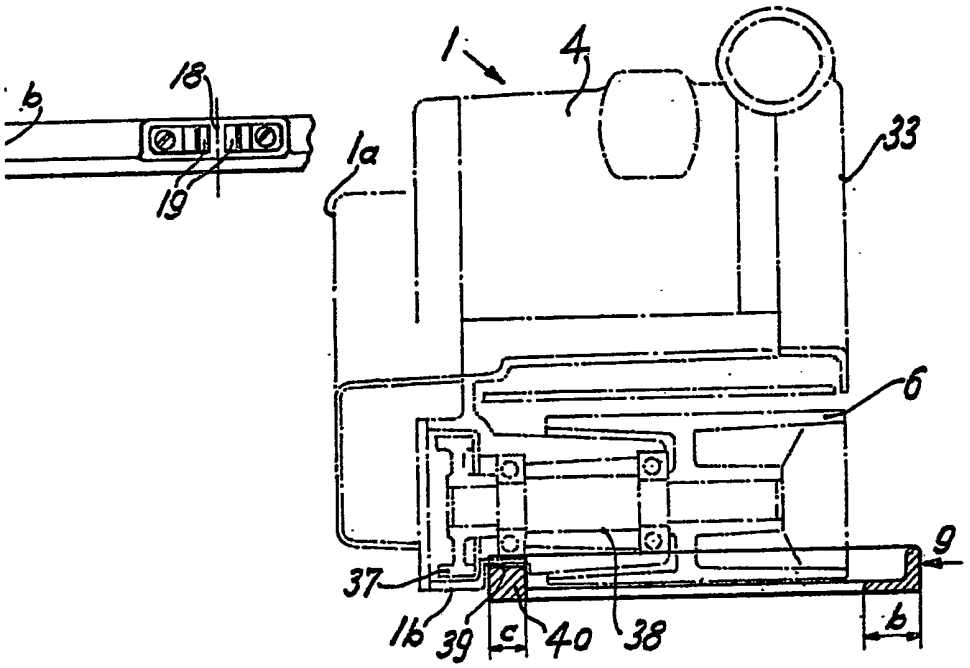

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Fig.3

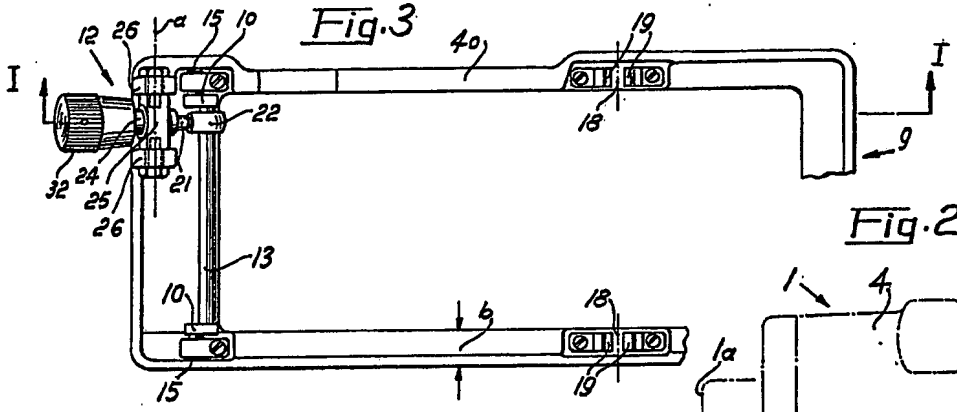


Fig.2

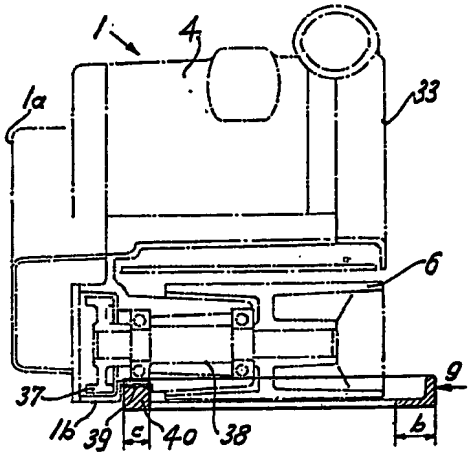
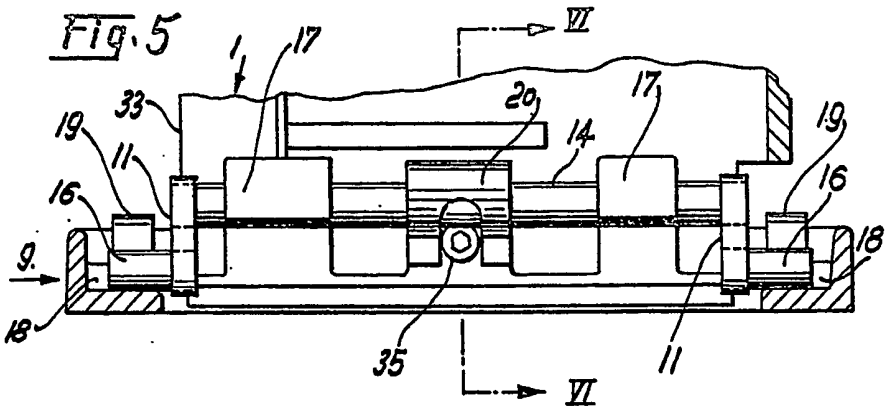


Fig. 5



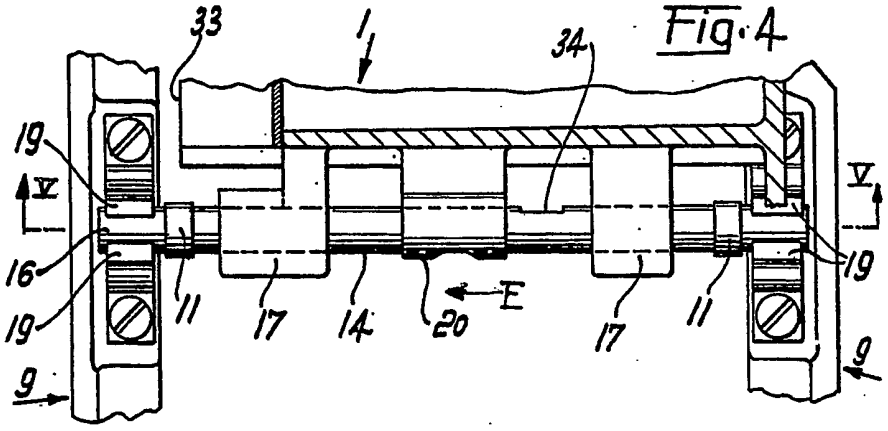


Fig. 4

Fig. 6

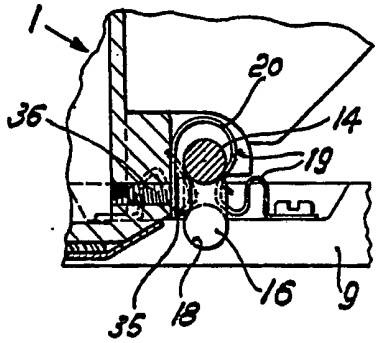


Fig. 7

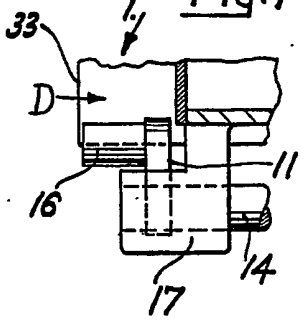


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Fig. 8

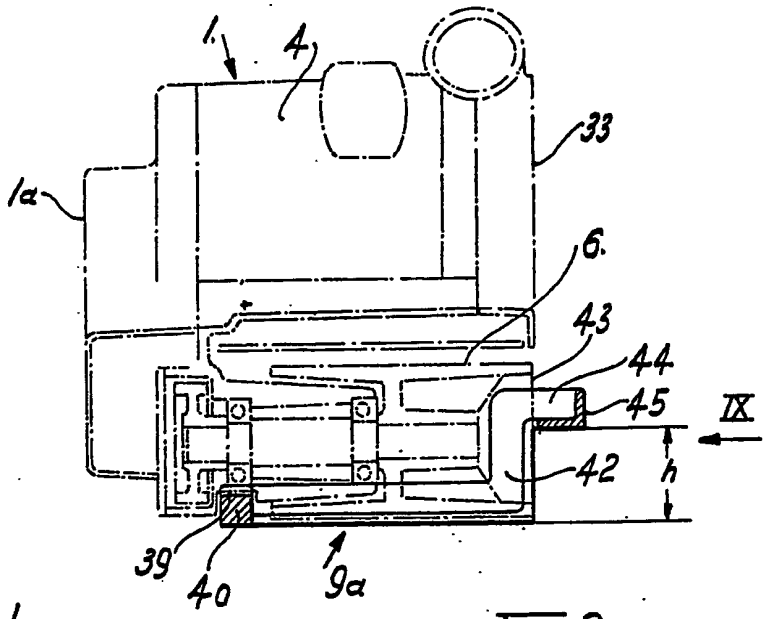

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Fig. 9.

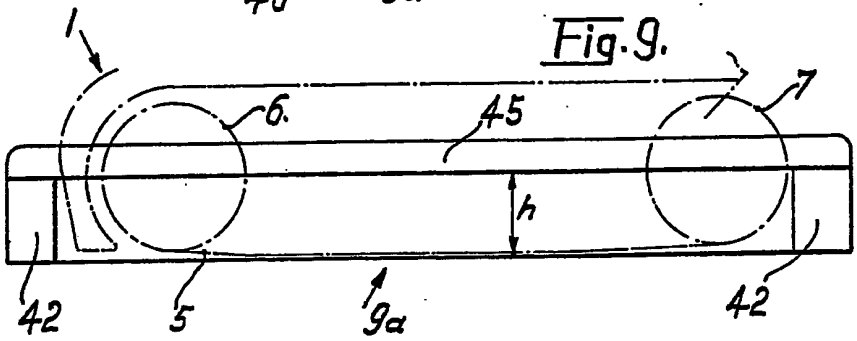

Fig. 12

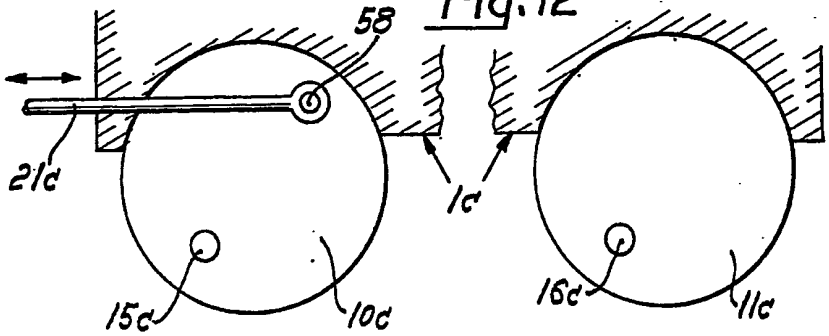

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Fig. 5

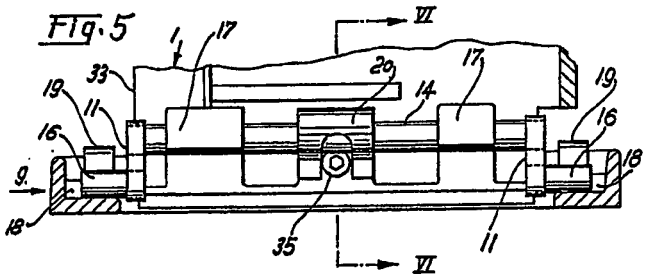
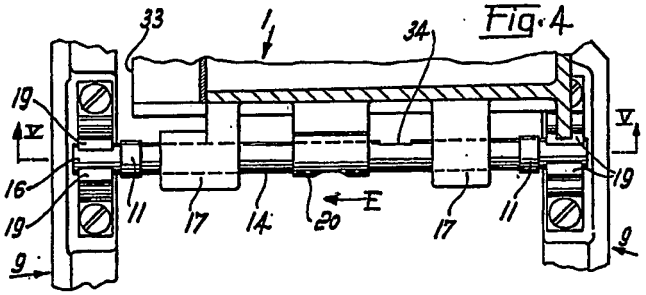


Fig. 4



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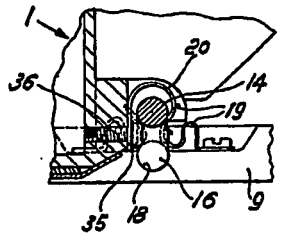

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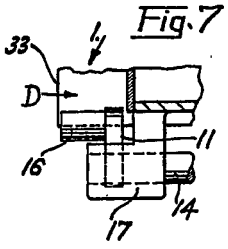

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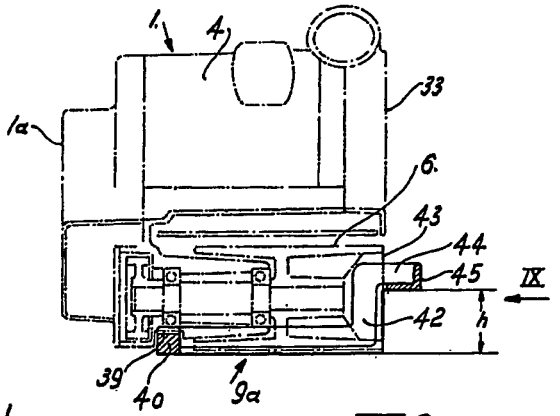

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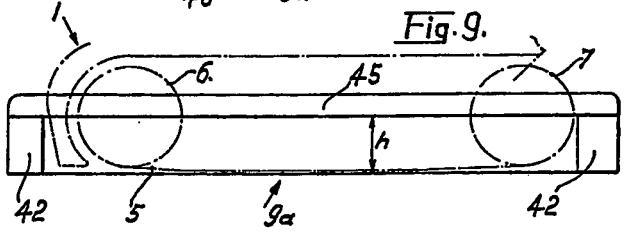

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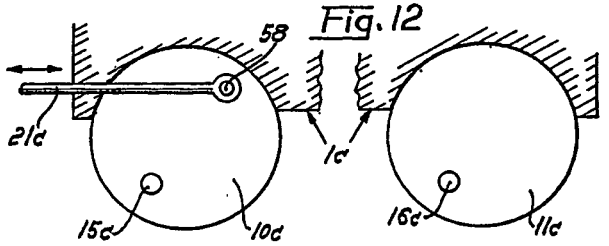

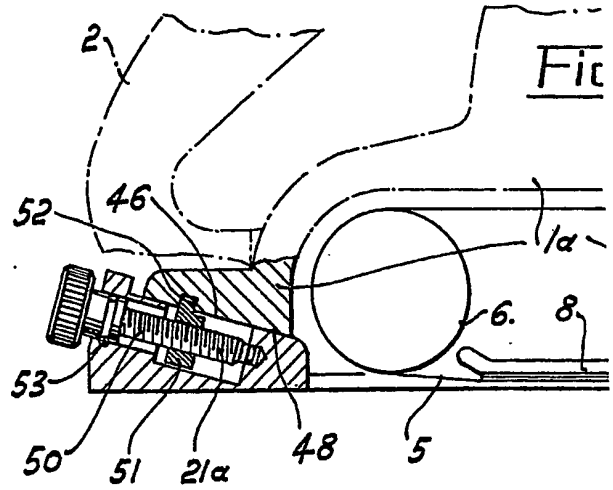
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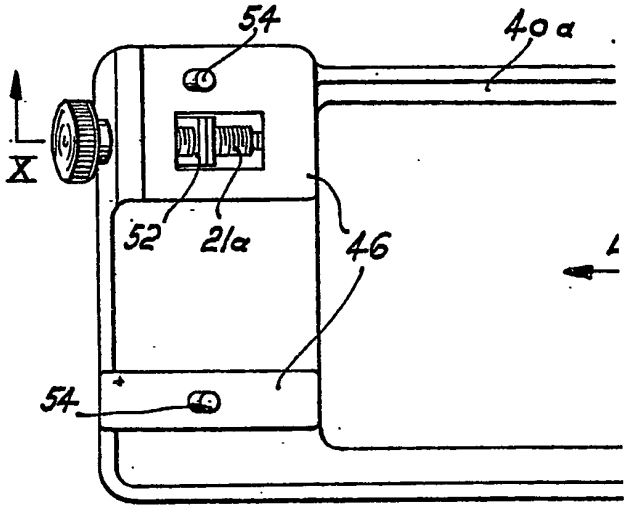

54
40a
X
52
21a
46
54

1,137,638
5 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

SHEET 5

Fig. 10

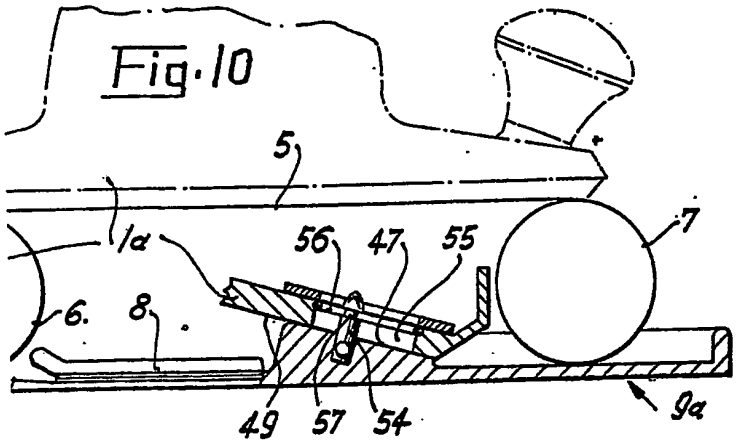
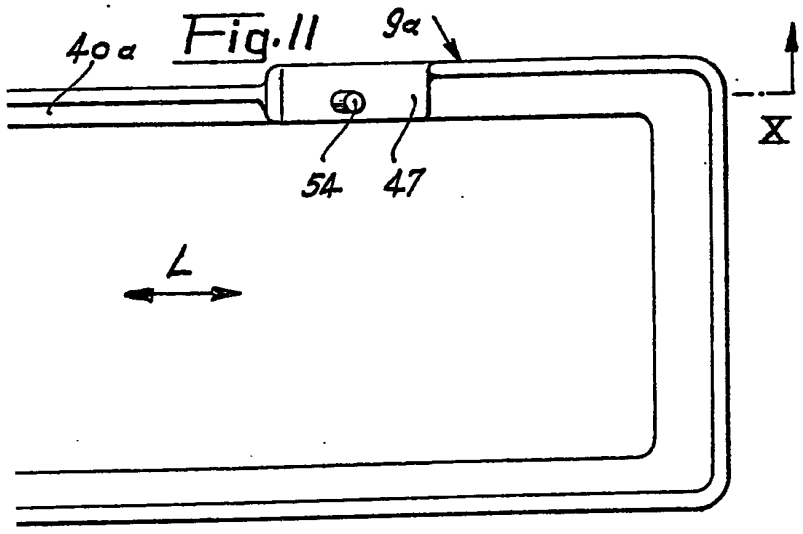


Fig. 11



1,137,638
5 SHEETS

COMPLETE SPECIFICATION

Fig. 10

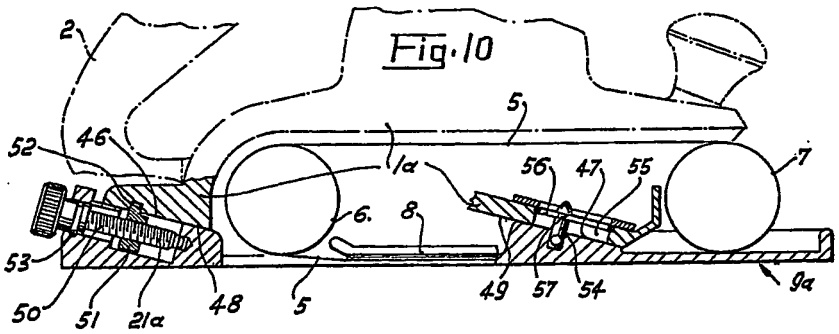


Fig. 11